U.S. Fish and Wildlife Service

# ***Fact Sheet*** – The Effect of Trees and Shrubs on Grassland Nesting Birds: An Annotated Bibliography

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It is generally accepted among resource managers that trees are detrimental to native grassland nesting birds, although they may be an important component of winter habitat for some species of resident wildlife. Nevertheless, published evidence of the effect of tees is sparse and scattered among studies with numerous objectives. Dr. Bakker undertook a project, funded by HAPET, to compile published information on trees and shrubs and grasslands birds. Effects of trees and shrubs were summarized by 4 factors:

1) trees and shrubs within the grassland patch,
2) perimeter of the patch comprised of shrubs (usually under 6 ft. tall) or trees,
3) distance from woodland habitat, and
4) the proportion of woodland habitat within the landscape.

Some of the highlights of the bibliography are summarized here. General management recommendations are marked with an arrow (➢), and supporting studies are given below (•). Specific guidelines regarding patch size or tolerable levels of tree and shrub abundance are generally lacking, but suggestions can be found in some articles. The full bibliography is available from HAPET (www.fws.gov/midwest/hapet/treebiliog.pdf or see contact information below) and in the Proceedings of the South Dakota Academy of Science.

**Nongame Birds:**

Nongame bird studies usually looked at the amount of trees and shrubs within a grassland patch in relation to the occurrence or density of birds.

- ➢ **Trees and shrubs within fields should be controlled to make patches more attractive to grassland nesting birds.**
  - In twelve studies, birds were less likely to occur in fields that had trees and shrubs. Four studies found no effect (positive or negative) on species occurrence.
  - Four studies concluded that although species may occur in fields with shrubs, they will be less numerous. One study found both negative and neutral effects on bird abundance, depending on the species.
- ➢ **Some low shrub cover is tolerable and should be allowed for grassland species that nest in shrubs.**
  - Clay-colored sparrows and dickcissels may be more likely to inhabit fields with some shrub cover. Both of these species will build nests in shrubs.
  - A study on northern harriers found that they preferred to nest in fields with some shrub cover.

Distance to trees and the proportion of field edge surrounded by trees have also been studied, usually to determine the effect on nest success or bird abundance. Most authors speculated that trees and shrubs surrounding fields provide a travel lane for mammalian predators and perch sites for avian predators and brown-headed cowbirds.

- ➢ **Trees and shrubs surrounding grassland patches should be removed to decrease nest predation and brood parasitism.**
- ➢ **Patches for restoration of grassland habitat should be as large as possible to decrease contact with edge predators.**
  - Predation rates on nests increased (1) when nests were closer to trees or shrubs in 4 of 4 studies, and (2) in fields with a higher proportion of edge in trees or shrubs in 2 of 3 studies.
  - One third of nest predations caught on video tape were by predators associated with wooded edges.

- Cowbird brood parasitism increased (1) when nests were closer to trees or shrubs in 2 of 2 studies, and (2) in fields with a higher proportion of edge in trees or shrubs in 2 of 2 studies.
- Bird densities were higher in areas that were far from trees and shrubs (3 of 3 studies).
- In 4 studies, bird densities were higher in fields with fewer trees and shrubs surrounding the field; another study found no effect for some species. One study found more eastern meadowlarks in fields with more hedgerows.

Researchers are just beginning to study the effects of landscape on nongame grassland birds.

- **Restoration focus areas for nongame grassland birds should be in landscapes with few trees and high amounts of grass to increase attractiveness of grass patches.**
  - Four of five studies found that bird densities were higher in landscapes with fewer trees; the fifth study found no differences.
  - Two studies found that as the amount of trees in the landscape increased, the less likely nongame birds would occur there.
  - Nesting success was found to be unrelated to the amount of trees in the landscape in one study.

### Prairie-Chickens:

All studies on prairie-chickens indicated a negative association with trees.

- **Trees in or near active mating display grounds (leks) and potential nesting areas should be removed.**
- **Maintenance of leks requires suppressing tree establishment in the surrounding landscape.**
- **Restoration areas for prairie-chickens should target treeless landscapes.**
  - Active prairie-chicken leks in Wisconsin and Minnesota had less forest cover in the surrounding landscape than random points.
  - Prairie-chicken leks in Minnesota that were used annually had less forest cover (average 1.6% in 2,000 acres) than leks used sporadically (average 3.2%).
  - Only 3 of 17 prairie-chicken nests in southwestern Missouri hatched when tree and shrub cover near the nest was >5%. When tree and shrub cover was ≤5%, 15 of 26 nests hatched.
  - Tree and shrub encroachment on the Sheyenne National Grasslands in North Dakota is believed to be reducing the quality of prairie-chicken nesting cover.
  - Landscapes with declining lesser prairie-chicken populations had more juniper encroachment than landscapes with stable populations in Oklahoma and Texas.

### Sharp-tailed Grouse:

Sharp-tailed grouse are associated with a variety of grassland and shrubland habitats, and trees and shrubs are used as winter cover. However, breeding sharp-tailed grouse display a negative relationship with extensive tree cover and overgrown shrubs. .

- **In brushy landscapes, prevent extensive tree and shrub encroachment.**
  - Sharp-tailed grouse in Minnesota were sensitive to even small increases (1-2%) in the amount of trees and shrubs in their home range.
  - In Manitoba, the habitat surrounding a sharp-tailed grouse lek must be <44% closed aspen forest and must be >23% prairie to sustain a population of grouse. Once aspen succeeds to >56% forest and less than 15% prairie remains, the lek will likely be abandoned.

### Ducks:

Ducks like mallards that routinely nest in grasslands seem to generally tolerate trees and shrubs. Some species may even prefer to nest in shrubs when grasslands themselves are in degraded condition. However, several studies indicate that trees may attract predators to the vicinity of nests by acting as traveling and feeding habitat for mammalian predators such as raccoons and as perches for avian predators like crows.

- **Remove trees before predators re attracted to a nesting area.**
  - Nesting success in Idaho was negatively affected by the density of Russian olive, mostly due to use by nesting magpies that destroyed duck nests.
- **Remove trees around wetlands to maintain attractiveness to duck broods.**
  - A study in western South Dakota found that trees along pond edges decreased use by mallard broods.

**Pheasants:**

Grassland is an essential component of pheasant habitat. Short to medium height trees and shrubs are also used pheasants. Shrubby and blocky tree plantings can provide pheasants with loafing, escape and winter cover, especially during years with heavy snow. As in the case of other species, trees also increase the likelihood of predation of adults and nests. Managers should remove trees unless they serve an alternative management objective.

- **Isolated trees and mature deciduous trees have little habitat value for pheasants, should not be planted, and should be removed where they already exist.**
  - Food plot use during four average to mild South Dakota winters was associated with the amount of wetland and grass cover in the surrounding area. Trees and shrubs appeared to be negatively associated with use.
  - During a typical South Dakota winter, cattail wetlands, tall grass, and food plots ranked highest in hen use, although tree cover was used at the end of a severe winter (a 1 in 10 year event) and may have prevented total mortality of hens that year.
  - Nesting success was lower in and near shelterbelts in South Dakota and Colorado.
  - Red-tailed hawks and great horned owls killed 36% of a spring-time pheasant population in southeastern Wisconsin.
- **If woody species are going to be planted for pheasants, they should have a high stem density near the ground (bushes).**
  - In early spring in eastern South Dakota, male pheasants preferred establishing breeding territories around shrubby habitat, although trees were not a required element pheasant home ranges.

**Summary:**

Trees and shrubs adversely impact habitat suitability and reproductive success of many species of grassland birds. In many Midwestern landscapes, trees are now so abundant that they are believed to contribute to declining populations of native grassland nesting species.

Nevertheless, trees and shrubs are widely used by wildlife managers as habitat for some species of resident wildlife, particularly during the winter. While generally speaking, the availability of trees does not limit populations of most species, the availability of native trees and shrubs may be more important. As trees mature, they stop being desirable habitat for even most resident species and should be removed.

As with any habitat management action, deciding where to plant or remove trees depends on a manager's objectives. Where trees and shrubs would have little impact on populations of native grassland species, planting limited amounts of native woody cover, or improving existing winter cover, may benefit resident wildlife. However, grassland managers should remove trees unless they serve a definite management objective.

For a copy of the bibliography contact:
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